

Pesticide Mitigation Effectiveness Guide

Reducing Pesticide Impacts on Water Quality

Application of the New York Pest Management Conservation Standard (595) requires environmental risk evaluation and appropriate mitigation for all identified resource concerns. **Table 1** identifies management techniques, while **Table 2** lists conservation practices that have the potential to mitigate pesticide impacts on water quality. Not all techniques will be applicable to a given situation. Relative effectiveness ratings by pesticide loss pathway are “no effect” (blank), “slight effect” (+/-), “moderate effect” (++/--), and “significant effect” (+++/---). The table also identifies how the techniques function. Effectiveness of any mitigation technique can be highly variable based “on site” conditions and how it is designed. Therefore, with guidance provided by the table, the site-specific selection and design of mitigation techniques that are appropriate for the identified resource concerns is left to the professional judgement of the conservation planner.

Table 1

Pest Management Mitigation Techniques	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Management Techniques ^{1/}				
Application Timing	+++	+++	+++	Reduces exposure potential - delaying application when significant rainfall events are forecast can reduce pesticide transport to ground and surface water, application when conditions are optimal can reduce the amount of pesticide applied, also delaying application when wind speed is not in accordance with label requirements can reduce pesticide drift to surface water
Formulations/Adjuvants	++	++	+	Reduces exposure potential – formulations and/or adjuvants that increase efficacy allow lower application rates
Lower Application Rates	+++	+++	+++	Reduces exposure potential - use lowest effective rate
Partial Treatment	+++	+++	+++	Reduces exposure potential - spot treatment, banding and directed spraying reduce amount of pesticide applied
Pesticide Label Environmental Hazard Warnings and BMPs	Required ^{2/}	Required ^{2/}	Required ^{2/}	Reduces exposure potential - label guidance must be carefully followed for pesticide applications near water bodies and on soils that are intrinsically vulnerable to erosion, runoff, or leaching
Scouting and Integrated Pest Management (IPM) Thresholds	+++	+++	+++	Reduces exposure potential - reduces the amount of pesticide applied. See below for NY Conservation Practices associated with IPM management.
Set-backs	+	++	+	Reduces exposure potential - reduced application area reduces amount of pesticide applied, can also reduce inadvertent pesticide application and drift to surface water
Soil Incorporation – mechanical or irrigation	---	+++	+++	Reduces exposure potential for surface losses, but increases exposure potential for leaching losses
Substitution – <ul style="list-style-type: none"> ▪ Alternative pesticides ▪ Cultural controls ▪ Biological controls 	+++	+++	+++	Reduces hazard potential - use alternative pesticides with low environmental risk, substituting cultural (including burning and mechanical controls) and biological controls can reduce the need for pesticides

Table 2

Conservation Practices ^{3/}

Mitigation Technique	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Agrichemical Mixing Center (NY702)	+++	+++	+++	Reduces the potential for point source pesticide contamination
Alley Cropping (311)	+	+	++	Increases infiltration and uptake of subsurface water, reduces soil erosion, can provide habitat for beneficial insects which can reduce the need for pesticides, also can reduce pesticide drift to surface water
Anionic Polyacrylamide (PAM) Erosion Control (450)	-	+	+++	Increases infiltration and deep percolation, reduces soil erosion
Bedding (310)	+	+	+	Increases surface infiltration and aerobic pesticide degradation in the root zone
Brush Management (314)	+++	+++	+++	Using non-chemical brush control often reduces the need for pesticides, pesticide use requires environmental risk analysis and appropriate mitigation - see Pest Management (595)
Conservation Cover (327)	+++	+++	+++	Retiring land from annual crop production often reduces the need for pesticides, builds soil organic matter
Conservation Crop Rotation (328)	++	++	++	Reduces the need for pesticides by breaking pest lifecycles
Constructed Wetland (656))	+	+	++	Captures pesticide residues and facilitates their degradation
Contour Buffer Strips (332)		++	++	Increases infiltration, reduces soil erosion
Contour Farming (330)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Contour Orchard and Other Fruit Area (Ac.) (331)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Cover Crop (340)	+	+	++	Increases infiltration, reduces soil erosion, builds soil organic matter
Cross Wind Ridges (589A)			(+) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water
Cross Wind Trap Strips (589C)			(++) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water, traps adsorbed pesticides
Deep Tillage (324)	-	+	+	Increases infiltration and deep percolation
Dike (356)	++/--	++	++	Reduces exposure potential - excludes outside water (++ leaching) or captures pesticide residues and facilitates their degradation (-- leaching)
Diversion (NY362)	+	+	+	Reduces erosion from concentrated flows; Increased sorption potential is increased due to grass strip above diversion.
Drainage Water Management (554)	++/--	++	++	Seasonal saturation may reduce the need for pesticides, drainage reduces storm water runoff, drainage increases infiltration and aerobic pesticide degradation in the root zone during the growing season (++ leaching), seasonal saturation may bring the water table in contact with pesticide residues from the previous growing season (-- leaching)

Table 2 - (continued)

Mitigation Technique	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Field Border (NY386)		+	++	Increases infiltration and traps adsorbed pesticides, often reduces application area resulting in less pesticide applied, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also can reduce inadvertent pesticide application and drift to surface water
Filter Strip - Area (NY393a) Filter Strip - Strip (NY393s)		++	+++	Increases infiltration and traps adsorbed pesticides, often reduces application area resulting in less pesticide applied, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also can reduce inadvertent pesticide application and drift to surface water
Forage Harvest Management (511)	++	++	++	Reduces exposure potential - timely harvesting reduces the need for pesticides
Forest Stand Improvement (666)	++	++	++	Reduces the potential for pest damage and the need for pesticides
Grade Stabilization Structure (410)			++	Traps adsorbed pesticides
Grassed Waterway (NY412)		+	++	Increases infiltration and traps adsorbed pesticides (should be applied with Filter Strips at the outlet and on each side of the waterway)
Grazing Land Mechanical Treatment (548)	-	+	+	Increases infiltration and deep percolation
Hedgerow Planting (NY422)			(+) 4/	Reduces adsorbed pesticide deposition in surface water, also can reduce inadvertent pesticide application and drift to surface water
Herbaceous Wind Barriers (603)			(+) 4/	Reduces wind erosion, traps adsorbed pesticides, can provide habitat for beneficial insects which reduces the need for pesticides, can provide habitat to congregate pests which can result in reduced pesticide application, also can reduce pesticide drift to surface water
Hillside Ditch (423)	+	+	+	Reduces exposure potential - water is diverted
Irrigation Land Leveling (464)	++	+	++	Reduces exposure potential - uniform surface reduces pesticide transport to ground and surface water
Irrigation System, Surface and Subsurface (443)	+	+	+	Reduces exposure potential - efficient and uniform irrigation reduces pesticide transport to ground and surface water
Irrigation System, Microirrigation (441)	++	+++	+++	Reduces exposure potential - efficient and uniform irrigation reduces pesticide transport to ground and surface water
Irrigation System Tailwater Recovery (447)		+++	+++	Captures pesticide residues and facilitates their degradation
Irrigation Water Management (449)	+++	+++	+++	Reduces exposure potential - water is applied at rates that minimize pesticide transport to ground and surface water, promotes healthy plants which can better tolerate pests

Table 2 - (continued)

Mitigation Technique	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Land Smoothing (466)	+	+	+	Reduces exposure potential - uniform surface reduces pesticide transport to ground and surface water
Mole Drain (482)	+	+	+	Increases infiltration and aerobic pesticide degradation in the root zone *Note – avoid direct outlets to surface water
Mulching (484)	+	+/-	+/-	Often reduces the need for pesticides, natural mulches increase infiltration and reduce soil erosion (+ solution and adsorbed runoff), artificial mulches may increase runoff and erosion (- solution and adsorbed runoff)
Nutrient Management (NY590)	++	++	++	Promotes healthy plants which can better tolerate pests
Pasture and Hay Planting (512)	++	++	++	Retiring land from annual crop production often reduces the need for pesticides, builds soil organic matter
Precision Land Forming (462)	++	+	++	Reduces exposure potential - uniform surface reduces pesticide transport to ground and surface water
Prescribed Burning (338)	++	++	++	Often reduces the need for pesticides
Prescribed Grazing (528A)	++	++	++	Improves plant health and reduces the need for pesticides
Range Planting (550)	++	++	++	Increases infiltration and uptake of subsurface water, reduces soil erosion, builds soil organic matter
Record Keeping (NY748)				IPM management practice
Recreation Area Improvement (562)	++	++	++	Increases infiltration and uptake of subsurface water, reduces soil erosion, builds soil organic matter
Residue Management, No-till and Strip-Till (329A)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Mulch-Till (329B)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Ridge Till (NY329C)	+	++	+++	Increases infiltration, reduces soil erosion, builds soil organic matter
Residue Management, Seasonal (NY344)	+	+	+	Increases infiltration, reduces soil erosion, builds soil organic matter
Riparian Forest Buffer (NY391)	+	+++	+++	Increases infiltration and uptake of subsurface water, traps sediment, builds soil organic matter
Riparian Herbaceous Cover (NY390)	+	++	++	Increases infiltration, traps sediment, builds soil organic matter
Row Arrangement (557)	-	+	+	Increases infiltration and deep percolation, reduces soil erosion
Sediment Basin (350)	-		++	Captures pesticide residues and facilitates their degradation
Stripcropping (585)		+	+	Increases infiltration, reduces soil erosion
Structure For Water Control (587)	-	++	+++	Captures pesticide residues and facilitates their degradation, increases infiltration and deep percolation
Subsurface Drain (NY606)	+	++	++	Increases infiltration and aerobic pesticide degradation in the root zone *Note – avoid direct outlets to surface water

Table 2 - (continued)

Mitigation Technique	Pesticide Loss Pathways			Function
	Leaching	Solution Runoff	Adsorbed Runoff	
Surface Drainage, Field Ditch (607)	+	+	+	Increases infiltration and aerobic pesticide degradation in the root zone
Surface Roughening (609)			(+) 4/	Reduces wind erosion and adsorbed pesticide deposition in surface water
Terrace (600)	--	++	+++	Increases infiltration and deep percolation, reduces soil erosion
Tree and Shrub Establishment (612)	+++	+++	+++	Retiring land from annual crop production often reduces the need for pesticides, increases infiltration and uptake of subsurface water, builds soil organic matter
Vegetative Barriers (601)			++	Reduces soil erosion, traps sediment, increases infiltration
Waste Storage Facility (NY313)	+	++	++	Captures pesticide residues
Waste Treatment Lagoon (359)		+++	+++	Captures pesticide residues and facilitates their degradation
Waste Utilization (NY633)	++	++	++	Increases soil organic matter
Water and Sediment Control Basin (638)	-	++	+++	Captures pesticide residues and facilitates their degradation, increases infiltration and deep percolation
Water Testing (NY 731)				IPM management practice
Waterspreading (640)	-	+	+	Increases infiltration and deep percolation
Well Decommissioning (351)	+++			Eliminates point source contamination
Wetland Creation (Ac.) (658)	+	+	+	Captures pesticide residues and facilitates their degradation
Wetland Enhancement (NY659)	+	+	+	Captures pesticide residues and facilitates their degradation
Wetland Restoration (657)	+	+	+	Captures pesticide residues and facilitates their degradation
Windbreak/Shelterbelt Establishment (380)			(++) 4/	Reduces wind erosion, reduces adsorbed pesticide deposition in surface water, traps adsorbed pesticides, also can reduce pesticide drift
Windbreak/Shelterbelt Renovation (650)			(++) 4/	Reduces wind erosion, reduces adsorbed pesticide deposition in surface water, traps adsorbed pesticides, also can reduce pesticide drift

^{1/} Additional information on pest management mitigation techniques can be obtained from Cornell Cooperative Extension pest management publications, pest management consultants and pesticide labels.

^{2/} The pesticide label is the law - all pesticide label specifications must be carefully followed, including required mitigation. Additional mitigation may be needed to meet NRCS pest management requirements for identified resource concerns.

^{3/} Details regarding the effects of Conservation Practices on ground and surface water contamination by pesticides are contained in the Conservation Practice Physical Effects matrix found in the National Handbook of Conservation Practices, and in Section V of the New York Field Office Technical Guide.

^{4/} Mitigation applies to adsorbed pesticide losses being carried to surface water by wind.